

Preserving the Past Pre-visit Introduction

<u>Time</u>	3 days
<u>Standards</u>	<p>Band Theme 5-8: Science Inquiry and Application:</p> <ul style="list-style-type: none"> • Identify questions that can be answered through scientific investigations; • Design and conduct a scientific investigation; • Use appropriate mathematics, tools and techniques to gather data and information; • Analyze and interpret data; • Develop descriptions, models, explanations and predictions; • Think critically and logically to connect evidence and explanations; • Recognize and analyze alternative explanations and predictions; and • Communicate scientific procedures and explanations. <p>Content Statement 6.ESS.4 Soil is unconsolidated material that contains nutrient matter and weathered rock.</p> <p>Content Statement 6.LS.4 Living systems at all levels of organization demonstrate the complementary nature of structure and function.</p> <p>CCSS.ELA-Literacy.RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts</p> <p>CCSS.ELA-Literacy.RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.</p> <p>CCSS.ELA-Literacy.RH.6-8.9 Analyze the relationship between a primary and secondary source on the same topic.</p>
	<ul style="list-style-type: none"> • Use primary and secondary sources to investigate the composition of Stan Hywet's Plane Tree Allée and Dell to determine how each has changed over time. • Students will apply the scientific method to an inquiry-based problem. • Students will analyze primary and secondary sources to conduct background research, formulate a valid scientific question, and develop a hypothesis relevant to the initial question. • Students will be introduced to and apply specific vocabulary terms applicable to the problem design. • Students will work with their teacher and with a team of their peers in achieving a shared goal. • Students will read through a specific procedure to test soil characteristics.
<u>Materials</u>	<p>Video https://www.youtube.com/watch?v=vZwgAdzp14Y&list=PLFEpVCsdEtd3CfAqXdG8OkyHG-mWpBQuZ&index=7 Letter</p>
<u>Anticipatory set</u> (10 min)	<p>DAY 1 Stan Hywet's expert staff has set up a problem introduced via a letter (in the Teacher's Manual), and a pre-recorded video with instructions which are located on the science HUB for APS (6th Grade Essentials) and on the Stan Hywet Hall & Gardens YouTube channel - https://www.youtube.com/channel/UCmHVvN1HEQ5ggTdOZnjbMzg .</p> <p>**Main Question to be answered: Is the soil at Stan Hywet Hall and Gardens meeting the needs of its plants so that they may thrive?</p> <p>** Introduce the project with enthusiasm – Have the lettered “delivered” to you</p>

	classroom & read it as an <i>invitation</i> to help with the problem.
<u>Materials</u>	<ul style="list-style-type: none"> • Student Manual • Ruler
<u>Intro</u>	<u>DAY 2</u>
5 - 10 minutes	1. Have the students do the Pre-Survey.
7 minutes	2. Review the Scientific Method. <ul style="list-style-type: none"> a. Observation, Ask question, Hypothesis, Observation/Experiment, Evaluation of Data, Conclusion b. How may the scientific method apply to our challenge? c. What step are we on in the beginning? d. What do we need to do to follow the scientific method from here?
10 minutes	3. Next, do the “Change over Time” at the beginning of the Student Workbook. Allow students to brainstorm or think-pair-share to the prompt: <i>Describe changes that you know happen on earth both naturally and because of human activity.</i>
3 minutes	4. Review the vocabulary provided in the back of the manual. Introduce the students to the different words and how they might be used in the days to come. Remind the students to refer to the vocabulary list when they come to a word they do not know.
	<u>DAY 3</u>
10-15 minutes	5. Work through “Designing the Landscape” which defines & explains what formal and informal features are.
10-15 minutes	6. Direct students to the “ Dell and Plane Tree Allée ” in the student workbook. Instruct students to compare and contrast the historic and contemporary photos and think about and discuss the following: <ul style="list-style-type: none"> a. What natural changes have occurred? b. What changes have occurred as a result of human activity? c. Has anything stayed the same over time? Why or why not?
20-25 minutes	7. Direct students to “Analyzing Blue Prints” and the page which follows and includes photographs from 1914, 1916, 1999, 2007. Ask them to.....
<u>Lesson reflection</u>	<p>Have students share some of their findings from the day</p> <ul style="list-style-type: none"> • What did they learn about landscaping? • Can they describe the changes viewed in the photographs? • Can they hypothesize why there are changes over time? • How do they believe they might help provide information or assistance to Stan Hywet Hall and Gardens?

Pre-Visit Activities/Experiments – Soil and Types of Testing

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<p>Objectives</p>	<ul style="list-style-type: none"> ● Students will research a soil system to discover how its properties influence its use by nature and by human beings. ● Students will follow a multistep procedure to determine if the soil within a historic landscape will continue to promote optimal health and survival of its plants. ● Students will demonstrate working knowledge and understanding that soil has many properties that are necessary for plants to survive and thrive. ● Students will understand soil is unconsolidated material that contains nutrient matter and weathered rock. ● Students will use appropriate mathematics, tools and techniques to gather data and information. ● Students will analyze and interpret data. ● Students will develop descriptions, models, explanations and predictions. ● Students will think critically and logically to connect evidence and explanations. ● Students will communicate scientific procedures and explanations to their peers and their larger audience.
<p>Garden History (30min)</p>	<p>To be done around activity 10 Lab aids</p>
<p>Materials</p>	<ul style="list-style-type: none"> ● Student Manual ● Computer

(20 minutes)	<p><u>DAY 4</u></p> <p>Have students complete the page titled “Soil Brainstorm” and then follow-up with “Native Soil” and “Background Information on Plants and Soil Requirements” worksheet. Break students up into 5 groups (pH, K, N, P, and worms).</p> <p>Have each experiment group read/research their experimental test. (What should be normal levels for their tests in healthy NE Ohio Topsoil?)</p> <ul style="list-style-type: none"> ● What are they testing for? ● Why is this nutrient factor important to soil? ● What can cause the nutrient level to change? ● What are the consequences of too much vs. too little of certain nutrients? ● How might this factor influence the garden plants? ● In your opinion, is this test something that the staff at Stan Hywet in the early 1900’s could have done? Why or why not?
(20 minutes)	<p>Complete the following study: <i>100 Years Later</i></p> <p>If computer access is not readily available, this section may need to be moved to accommodate computer availability.</p> <p style="text-align: center;">Necessary information and links are located on the science HUB for APS (6th Grade Essentials).</p> <p>Create a hypothesis for your group’s test. What do you expect to discover at Stan Hywet? Why do you think this?</p> <p>** Ask students to begin thinking about their post-visit project. They can begin their introduction by using this background information they have just learned.</p> <p>Teacher note: <i>If computer access is limited, the class can be split in half for history reading and plant research.</i></p> <p><i>If the students have trouble with any of the terms used in the background reading sections, have them highlight unfamiliar words and look them up in the vocabulary section. Work as a class or in groups to find meaning.</i></p> <p><u>Note for the Plant Discovery Section:</u> <i>Please advise the students that information they may find on each plant will vary. The information fields may not be filled for each plant. There is still much information about the world that science has not yet studied. They are now on the leading edge of science!</i></p> <p>Procedure</p> <ol style="list-style-type: none"> 1. Read through a brief history of the gardens/grounds one section at a time. Lead discussions with the class based on the questions provided in the packet. 2. Have each of the students select a plant from the workbook list and research online using provided links to find information about it. The goal is to become an expert on that plant and can share the information with the class. Some research questions to consider include: <ol style="list-style-type: none"> a. Is the plant native to Ohio?

	<p>b. What is its habitat and geographic distribution? c. What are its needs? What kind of soil does the plant prefer? How much water and sunlight is required for the plant?</p> <p>Teacher note: To find plant information make sure that spelling and spacing is accurate. On the USDA site, access online in-depth information for the plants that have a “Characteristics” link. Note also that the map on the first plant page is a <u>current</u> range map, not a <u>native</u> range map. The native range can be found by clicking the “View Native Status” link under the map, and referencing the “Native Status” section of the General Characteristics.</p> <p>3. Based on what you have learned so far, compare and contrast the two specific gardens we are studying, the Dell and the London Plane Tree Allee.</p> <p>Class Discussion Questions</p> <ul style="list-style-type: none"> • What might happen to the gardens if maintenance stopped? Short term? Long term? • Why would Manning plant non-native plants in the gardens?
<p>Soil Permeability (30min)</p>	<p>Aligns with Activity 5 Lab aids</p>
	<p>Materials (per group preferably)</p> <ul style="list-style-type: none"> • 3 - 2L bottles with bottoms cut off • Screen mesh (cut into 3x3 inch squares) • Magnifying glasses - 1 for each participant or set of partners. • Soil samples of sand, silt, and clay. <p><u>Note:</u> "Play sand" can be purchased at a home improvement store in the garden section. Silt and clay can be purchased through a catalog company such as Ward's Natural Science www.wardsci.com</p> <ul style="list-style-type: none"> • Soil sample from backyard or other source (optional) • 100 mL graduated cylinder • 400 mL beakers • 3 - 2 liter bottles or Ring stands & Ring clamps • Stopwatch • Water • Paper towels <p>Teacher note: This experiment can be conducted as a classroom demonstration by groups with assigned parts <u>or</u> each group can conduct the entire experiment.</p> <p>Procedure</p> <ul style="list-style-type: none"> • Have the students brainstorm and write down what they know, or think they know, about soil. • Prepare small containers with each of the soil components: sand, silt, and clay. • Have students observe, magnify, and feel the soil. • Record student observations in a Venn diagram and have students draw examples of the particles.

	<ul style="list-style-type: none"> ● Transition to the large experiment by setting up the components and deciding who will perform the tasks in their groups. ● Make sure the students record their hypothesis and predictions for the experiment they are about to perform. ● After conducting the experiment, have students record their individual results on the board, then find the class average. ● Have students answer questions first on their own then review as a class. <p>Class Discussion Questions</p> <ul style="list-style-type: none"> ● Did your predictions match the results? ● How might soil change over time? From sand to clay? <ul style="list-style-type: none"> ○ Weathering, Erosion, addition or depletion of organic matter and nutrients. ● What factors could change how permeable soil is? <ul style="list-style-type: none"> ○ Amount of water, compaction, surface angle, space created by plant roots.
Soil Texture (30 min)	Aligns with Activity 4&5 Lab aids
	<p>These simple exercises are quick and easy ways to classify a soil.</p> <p>Materials</p> <ul style="list-style-type: none"> ● Results from Activity 4&5 Lab aids, or see teacher note <p>Teacher Note: For teachers without “lab aids,” provided is an experiment that should be conducted prior to this experiment.</p> <p>Procedures</p> <ol style="list-style-type: none"> 1. First, reflect on the experiment you conducted in class during which you separated the soil into its different particle sizes. Use the percentages obtained from that experiment on the soil triangle and it will give you an approximation of the soil types you have. 2. The second method is a hands-on approach whereby following the flowchart provided, the soil type can be determined by feeling texture. <ol style="list-style-type: none"> a. Try this process with each soil type. b. Can be done with the soil at the school as well. <p>Class Discussion Questions</p> <ul style="list-style-type: none"> ● What are the three main different types of soils? ● How can you tell soils apart? ● How do the three types of soil interact with water? ● Do you need tools to classify soil? Why or why not?
Reference	<p>Plant Nutrients: http://www.ncagr.gov/cyber/kidswrld/plant/nutrient.htm (NC Agriculture Plant Nutrients)</p> <p>Garden History Plant Info</p> <ul style="list-style-type: none"> ● http://plants.usda.gov/ (USDA Plant Database) ● http://www.wildflower.org/plants/ (Wildflower and Plant Database) ● http://ohioline.osu.edu/hyg-fact/1000/1239.html (OSU Extension Hostas) <p>Soils</p>

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| | <ul style="list-style-type: none">• http://earthsci.org/education/investigations/ies/Soils/Soil.htm - Throughout this module, students will use hands-on, inquiry-based explorations to investigate the following in 7 different modules:<ul style="list-style-type: none">• materials in soil• arrangement of soil materials• amount of water the soil can hold• how water flows through soil• http://soilandwater.ohiodnr.gov/swcds/find-a-local-swcd (ODNR<ul style="list-style-type: none">• Click on “Soil Conservation”• http://homeguides.sfgate.com/pine-bark-soil-conditioner-101383.html (Pine Fines help condition the soil)• http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/edu/ (USDA - Soil Education) |
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